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Medical Information

Epidural Blood Patch

A Safe, Effective Treatment for Postlumbar-Puncture Headaches

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CORNING DESCRIBED the first postlumbar-puncture headache (PLPH) in 1885.[1] Since then, many different treatments have been advocated for this common, iatrogenic complication of diagnostic, therapeutic and anesthetic lumbar punctures.[2] Bed rest, increased fluid intake and analgesic drugs constitute the basic management for patients with PLPH. Since 1970 anesthesiologists have used the epidural blood patch (EBP) to treat severe PLPH. The purpose of this review is to familiarize other physicians carrying out lumbar punctures with the effectiveness and safety of the epidural blood patch procedure.

Bier in 1898, Sicard in 1902 and MacRobert in 1918 postulated that PLPH was due to leakage of spinal fluid through the dural puncture site.[1] Support for this theory came from manometric studies which showed a significant decrease in spinal fluid pressure between the time of spinal puncture and the onset of PLPH.[3,4] Direct observations during myeloscopy,[5] during surgical operation[6] and at autopsy[4] confirm that the dural hole remains patent and continues to leak fluid in patients with PLPH. Headaches identical with PLPH were produced acutely by draining spinal fluid from healthy human subjects.[7]

When a patient with PLPH assumes an upright position, the relative deficit in spinal fluid volume presumably deprives the brain of its fluid cushion and places tension on pain sensitive anchoring structures. Thus classically, the headache appears or is exacerbated by standing and is relieved by lying down. The headaches, which vary in intensity, usually occur one to three days following lumbar puncture and may be associated with nausea, vomiting, dizziness or visual disturbances. The mean duration of untreated PLPH is four days,[8] and 80 percent of patients will recover spontaneously within two weeks.[9] However, rarely, PLPH may persist for three to five months.[6,10]

Since PLPH is believed to be caused by fluid leak, a variety of attempts have been made to seal the dural rent in order to relieve the headache. Nelson[4] in 1930 used catgut dural plugs and successfully alleviated PLPH in approximately 50 percent of his patients. However, technical difficulty with this method, and a 50 percent incidence of cauda equina syndrome following its use, prevented the widespread acceptance of this technique. Nelson theorized that epidural bleeding from a traumatic dural puncture might lead to clot formation over the dural tear, which, in turn, would prevent spinal fluid loss. Gormley stated that the incidence of PLPH was lower than anticipated after inadvertent bloody spinal taps.[11] He reported the cases of seven patients, in all of which there was immediate relief of PLPH when 2 to 3 ml of autologous venous blood was injected into the patients' lumbar epidural spaces.[11] Ozdil claimed a 100 percent success rate in preventing PLPH in surgical patients undergoing spinal anesthesia by depositing 2.5 ml of clotted autologous blood epidurally as the spinal needle was being withdrawn.[12] DiGiovanni popularized the technique now known as epidural blood patching (EBP) for the treatment of PLPH.[13,14]

To carry out a epidural blood patch the patient is placed in the lateral decubitus position and the back is prepped and draped. A skin wheal is raised using a local anesthetic, and a needle is placed in the epidural space at the same level as the previous spinal puncture. Using aseptic technique, a venipuncture is done and 5 to 10 ml of blood is withdrawn with a plastic syringe and then injected into the epidural space. The patient is kept supine for 30 to 60 minutes and liberal amounts of fluids are given intravenously. The therapeutic results of EBP are dramatic. The patient usually notes total relief of symptoms on first assuming the upright position. Headaches seldom recur. Since Gormley's[11] and DiGiovanni's[13,14] initial reports, thousands of epidural blood

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TABLE 1.—*Published Results of Epidural Blood Patch (EBP) for the Treatment of Postlumbar-Puncture Headaches (PLPH)*

Source	*Year*	*Number Patients*	*Relief After First EBP*	*Relief After Second EBP*	*No Relief*
Gormley[11]	1960	7	7 (100.0%)	....	0
DiGiovanni[13]	1970	45	41 (91.1%)	....	4 (8.9%)
DiGiovanni[14]	1972	63	61 (96.8%)	....	2 (3.2%)
Glass[15]	1972	50	47 (94.0%)	....	3 (6.0%)
DuPont[16]	1972	42	40 (95.2%)	1/1	1 (2.4%)
Vondrell[17]	1973	60	58 (96.7%)	....	2 (3.3%)
Ostheimer[18]	1974	185	182 (98.4%)	....	3 (1.6%)
Abouleish[19]	1975	118	105 (89.0%)	10/11	3 (2.5%)
TOTALS		570	541 (94.9%)		18 (3.2%)

patches have been done and many clinical studies have substantiated the effectiveness of treating PLPH with EBP[15-19] (See Table 1). Ninety-five percent of headaches are relieved with a single EBP, and an overall cure rate of 97 percent is achieved if a second blood patch is administered.

The epidural blood patch probably forms a gelatinous tamponade which prevents further leakage of spinal fluid allowing the dura to undergo normal healing.[14] Placement of unclotted autologous blood in the epidural space results in no greater tissue reaction than that which occurs following routine lumbar puncture, and less than that following laminectomy.[14] Large volumes of saline deposited in the epidural space will relieve PLPH,[20,21] but saline is readily absorbed and consequently the relief produced may only be temporary.[22,23] Epidural blood patching effects a permanent cure for the headache. Unfortunately, for unknown reasons, prophylactic placement of unclotted autologous blood epidurally at the time of lumbar puncture will not prevent PLPH.[23] Regional anesthesia can be carried out without difficulty at a later date at the same lumbar level as the epidural blood patch.[24]

A few patients have complaint of transient paresthesias in their legs and toes, stiff neck, abdominal cramping, tinnitus, vertigo or dizziness during the blood injection. An increase in temperature lasting several hours has been observed in some patients.[19] Mild backache at the puncture site, occasionally lasting as long as 48 hours, may occur.[18,19] No permanent neurologic complications have been reported following EBP.[19] A very small number of patients in whom this procedure is done may have uncomfortable neurologic symptoms. In two cases, patients had severe radicular leg pains following successful treatment of PLPH with epidural injection of 10 ml and 7.5 ml of autologous blood.[25,26] The clot from too large a volume of injected blood may have caused nerve root compression.[25] DiGiovanni,[25] in his discussion of the first case, felt that the radicular pain symptoms were secondary to hematoma formation from traumatic epidural needle placement, and were unrelated to the volume of blood actually injected. It would seem prudent, however, to use smaller volumes of blood in older and shorter patients.[25] This may also be true in pregnant patients where the epidural space is decreased in size; but, experience with the epidural blood patch during pregnancy is unreported.

Two complications feared after epidural blood patch are epidural abscess formation[27] and adhesive arachnoiditis. Neither has yet been reported to follow EBP, and the latter is more theoretical than a real consideration.[14] Patients with septicemia, local infection or inflammation in the lumbar back area, patients with blood dyscrasias and those receiving anticoagulant therapy should not receive EBP.[14,20] If bleeding occurs during the EBP the procedure should be discontinued, since subsequent hematoma formation may cover the dural hole, and the addition of the EBP may lead to nerve root compression.[25] If the headache persists, the epidural blood patch may be reattempted the following day at a different interspace.[20]

The reported incidence of PLPH following spinal anesthesia in general is 13 percent, and in obstetrics is 18 percent. PLPH occurs in 32 percent of patients after diagnostic lumbar punctures. Although the use of small gauge needles for lumbar puncture has decreased the overall occurence,[28,29] PLPH still is common. If PLPH is refractory to conservative management, or if the hospital stay is prolonged because of the headache and associated symptoms, autologous epidural

blood patching should be considered. The remarkably high success rate of this procedure, coupled with its extremely low morbidity, makes epidural blood patching a safe, sure method for treating post-lumbar puncture headaches.

Summary

Postlumbar-puncture headache is believed to result from continued leakage of spinal fluid through the dural perforation. PLPH can be treated with bed rest, increased fluid intake and analgesic drugs. An epidural blood patch should be considered for PLPH refractory to conservative management. Placement of 5 to 10 ml of autologous blood in the epidural space will seal the dural puncture site and relieve the headache and associated symptoms. The remarkably high success rate of this simple procedure, coupled with an extremely low morbidity, makes epidural blood patching a safe and effective method for treating PLPH.

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